Trans-Lake Washington Project

Multi-Modal Alternatives Evaluation - Environmental Findings

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3. ENVIRONMENTAL FINDINGS

The chapter summarizes the environmental findings for the multi-modal alternatives for the Trans-Lake Washington Project. This summary is based on Appendix B to this report, which includes a detailed description of the affected environment; environmental consequences; and potential avoidance, minimization, or mitigation measures for 12 environmental analysis areas. The environmental findings are based on the screening criteria adopted by the Trans-Lake Washington Executive Committee on October 25, 2000. The screening criteria are described at the beginning of the discussion for each resource section. A ratings table for each environmental criterion is included at the end of each section. A summary table including the ratings for all environmental criteria is included at the end of this chapter.

3.1 AIR QUALITY

Screening Criteria: *A screening-level evaluation of potential effects of changes in emissions of nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOCs) from operation will be conducted based on professional judgment and the experience of other similar projects. Anticipated VMT, VHT, and average vehicle speed will be used to assess the potential for alternatives to demonstrate conformity with requirements of the Clean Air Act Amendments.*

3.1.1 Impacts of Each Alternative

All alternatives would involve high volumes of traffic and periods of congestion that would affect the degree of vehicle emissions. By the 2020 Baseline, regional air quality is projected to be within current federal standards, in part because vehicles will be required to operate more cleanly. For this multi-modal analysis, the traffic data for the alternatives is not sufficient to assess the potential for each alternative to cause the region to exceed air quality thresholds. Therefore, this analysis does not focus on the regulatory threshold, but rather reflects the relative increase in emissions that would be expected.

All alternatives would result in some level of temporary construction impacts, consisting of fugitive dust, increases in particulate matter (PM_{10} and $PM_{2.5}$), and small amounts of construction machinery emissions (carbon monoxide and NO_x).

3.1.1.1 Alternative 1 (No Action)

Alternative 1 is the alternative against which the projected daily traffic volumes, VHT, and average travel speed of all the other alternatives were compared in order to rank impacts on air quality. Primary emphasis was placed on daily traffic volume, using VHT and average travel speed to distinguish between two alternatives if their volumes were very close.

For reference, daily traffic volumes for the No Action Alternative in year 2020 are projected to be 28 percent greater than those in 1995. Likewise, VHT is projected to be 90.8 percent greater and average travel speed 30.4 percent lower. These numbers indicate that, unless significant

reductions are made in vehicle emissions, the No Action Alternative is likely to have some impact on air quality.

For this programmatic-level analysis, a qualitative comparison of the impacts relative to the No Action Alternative were made, recognizing that the traffic data upon which the comparison is based are in preliminary stages of development. Since this alternative had the second lowest projected daily volumes of all alternatives, it was assumed to carry a least impact rating.

3.1.1.2 Alternative 2 (Safety & Preservation, I-90 LRT)

Alternative 2 had the lowest projected daily volumes of all alternatives. It also had conflicting indicators of congestion, with VHT being higher than the No Action Alternative, but average travel speed also being slightly higher. For this reason, Alternative 2 was given the same rating as the No Action Alternative.

3.1.1.3 Alternative 3 (SR 520 HOV, I-90 LRT)

Alternative 3 had slightly higher projected daily volumes than the No Action Alternative. VHT and average traffic speed both indicated reduced congestion, with VHT being lower than the No Action Alternative, and average travel speed being slightly higher. For this reason, Alternative 3 was given the same rating as the No Action Alternative.

3.1.1.4 Alternative 4 (SR 520 HOV, GP, I-90 LRT)

Alternative 4 had the third highest traffic volumes of the multi-modal alternatives. Both VHT and average travel speed are projected to increase slightly above the No Action Alternative. Therefore, Alternative 4 is assumed to have medium impacts.

3.1.1.5 Alternative 5 (SR 520 HOV, SR 520 HCT)

Alternative 5 had slightly higher projected daily volumes than the No Action Alternative. VHT and average travel speed both indicated reduced congestion, with VHT being lower than the No Action Alternative, and average travel speed being slightly higher. For this reason, Alternative 5 was given the same rating as the No Action Alternative.

3.1.1.6 Alternative 6 (SR 520 HOV, GP, SR 520 HCT)

Alternative 6 had the second highest traffic volumes. Both VHT and travel speed are projected to increase slightly above the No Action Alternative. Therefore, Alternative 6 is assumed to have medium impacts.

3.1.1.7 Alternative 7 (SR 520 HOV/BRT)

Alternative 7 had slightly higher projected daily volumes than the No Action Alternative. However, VHT is projected to increase slightly and travel speeds are projected to decrease as compared to the No Action Alternative. Therefore, Alternative 7 is assumed to have low impacts.

3.1.1.8 Alternative 8 (SR 520 HOV/BRT, GP)

Alternative 8 had the highest projected daily volumes of all alternatives. VHT is also projected to be higher than the No Action Alternative. Travel speed shows the largest improvement of all alternatives projected to decrease as compared to the No Action Alternative. However, based on the high daily traffic, Alternative 8 is assumed to have the most impacts of the multi-modal alternatives.

3.1.2 Rating of Alternatives

Because of the programmatic-level of detail for this screening analysis, no mitigation is proposed for any operational impacts. Appropriate project-level mitigation will be identified during preparation of the environmental impact statement. Mitigation for construction impacts would be required. The multi-modal alternatives were given two ratings: (1) relative impacts and mitigation required for each alternative, and (2) the feasibility of that mitigation. In addition, the alternatives were ranked based on the impacts associated with each alternative and the feasibility of mitigating those impacts. Each alternative was ranked relative to the other alternatives with 8 being the alternative with the least impacts to air quality resources, and 1 being the alternative with the most impacts.

RATING SCALE

WORST → BEST				
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

	Alternative							
Air Quality	**1: No Action**	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts and Extent of Mitigation Required	3 least	3 least	3 least	2 medium	3 least	2 medium	3 least	1 most
Feasibility of Proposed Mitigation	NA	3 medium feasibility	3 medium feasibility	3 medium feasibility	3 medium feasibility	3 medium feasibility	3 medium feasibility	3 medium feasibility
Ranking	7	8	6	3	5	2	4	1

3.2 WATER RESOURCES

Screening Criteria: *A qualitative analysis of potential impacts on surface and ground water, including the State 303(d) list of water bodies that do not meet water quality standards, will be conducted. The amount of new pollution-generating surface will be estimated, with consideration of measures necessary to avoid untreated discharges. The relative availability of land to accommodate stormwater runoff treatment measures will be considered. In addition, existing flooding problems in receiving streams will be identified.*

3.2.1 Impacts of Each Alternative

The proposed alternatives have many of the same impacts on water resources. Alternative 6 would have the greatest overall impact because it would have the widest configuration in the SR 520 corridor. However, many of the impacts associated with width such as increased pollutant-generating impervious surface (PGIS) and total impervious area (TIA) are easily mitigated through the use of conventional water quality treatment and detention best management practices (BMPs) (except on the floating bridge). The potentially significant impacts associated with each alternative are summarized in Table 3.2-1.

Table 3.2-1 Summary of Potentially Significant Water Resources Impacts

	Alternative							
Impacts	**1: No Action**	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/ BRT**	**8: HOV/ BRT, GP**
Direct								
Place Yarrow Creek in a culvert or relocated channel			X	X	X	X	X	X
Extend Goff Creek culvert, put tributary in a pipe or relocate			X	X	X	X	X	X
Extend culvert North Branch Kelsey Creek			X	X	X	X		
Fill north of SR 520 in Bear Creek floodplain			X	X	X	X	X	X
New bridge over Bear Creek, fill in floodplain, loss of riparian vegetation, confined channel		X	X	X	X	X		
New bridge over the Sammamish River, fill in floodplain		X	X	X	X	X		

Impacts	Alternative							
	1: No Action	2: S&P, I-90 LRT	3: HOV, I-90 LRT	4: HOV, GP, I-90 LRT	5: HOV, 520 HCT	6: HOV, GP, 520 HCT	7: HOV/ BRT	8: HOV/ BRT, GP
Construction								
Shoreline construction Foster Island and Portage Bay: increased turbidity and spills		X	X	X	X	X	X	X
Construction of cut-and-cover tunnel under Ship Canal: increased turbidity and spills			X	X	X	X	X	X
Nearshore construction/over-water work, Lake Washington: increased turbidity and spills		X	X	X	X	X	X	X
Yarrow Creek culvert extensions: increased turbidity and spills			X	X	X	X	X	X
Goff Creek culvert extensions, pipe/relocate tributary: temporary stream by-pass, increased turbidity and spills (north of SR 520)			X	X	X	X	X	X
Cut-and-cover tunnel under Goff Creek: temporary stream by-pass, increased turbidity and spills (south of SR 520)		X	X	X	X	X		
North Branch Kelsey Creek culvert extension: increased turbidity and spills			X	X	X	X		
Construction of a bridge, Sammamish River: increased turbidity and spills		X	X	X	X	X		
Modification of SR 520 bridge; Sammamish River: increased turbidity and spills		X	X	X	X	X		
Construction of aerial structure, Bear Creek:: increased turbidity and spills		X	X	X	X	X		

3.2.2 Rating of Alternatives

Alternatives 3, 4, 5, and 6 would impact the greatest number of water resources. Alternative 6 would have the greatest impact on water quality and hydrology because it would create the most impervious surface area.

The multi-modal alternatives were given two ratings: (1) relative impacts and mitigation required for each alternative, and (2) the feasibility of that mitigation. In addition, the alternatives were

ranked based on the impacts associated with each alternative and the feasibility of mitigating those impacts. Each alternative was ranked relative to the other alternatives, with 8 being the alternative with the least impact on water resources, and 1 being the alternative with the most impact. In general, the alternative with the widest typical footprint would have the greatest impact.

RATING SCALE

WORST → BEST				
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

Water Resources	**Alternative**							
	1: No Action	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts and Extent of Mitigation Required	3 least	**2** medium	**1** most	**1** most	**1** most	**1** most	**1** most	**1** most
Feasibility of Proposed Mitigation	NA	**1** least feasible	**1** least feasible	**1** least feasible	**1** least feasible	**1** least feasible	**1** least feasible	**1** least feasible
Ranking	8	7	3	2	4	1	6	5

Some impacts associated with Alternatives 3, 4, 6, 7, and 8 could be avoided by removing the cut-and-cover tunnel underneath the Montlake Cut. Impacts on Bear Creek associated with Alternatives 3, 4, 5, and 6 could be avoided by realigning the HCT segment and by placing fill south of the SR 520 alignment. Alternatives 7 and 8 could also avoid impacting water resources by placing fill south of the SR 520 alignment in the Redmond area.

3.3 FISH-BEARING STREAMS/THREATENED AND ENDANGERED SPECIES

Screening Criteria: *A qualitative assessment of potential direct effects on Lake Washington and known, mapped streams bearing listed and proposed fish species will be conducted. Potential direct effects will be reported by numbers of streams and amount of waterbody affected. A qualitative rating will reflect the seriousness and probability of the potential direct and indirect effects and potential difficulty in complying with requirements of the Endangered Species Act.*

This analysis includes state sensitive and priority species and habitats, as well as state and federally listed threatened and endangered species per the request of Washington State Department of Fish and Wildlife (letter to K. Farley from WDFW, February 23, 2001).

3.3.1 Impacts of Each Alternative

The proposed alternatives have many of the same impact on water and fishery resources. Alternative 6 would have the greatest overall impact because it would have the widest configuration. The most significant construction-related impacts on fishery resources are increased turbidity, sedimentation and erosion, potential pollutant loading from spills, and the disruption of riparian vegetation. Long-term impacts would occur because of increased runoff and pollutant loading from impervious surface areas and shading of aquatic habitat by aerial structures. However, many of the short- and long-term impacts can be mitigated through the use of conventional water quality treatment and detention BMPs (except on the floating bridge). The potentially significant impacts associated with each alternative are summarized in Table 3.3-1.

Table 3.3-1 Summary of Potentially Significant Fishery Resources Impacts

	Alternative							
Impacts	**1: No Action**	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Direct Impacts								
Increased shading and/or predator fish habitat in Portage Bay/Foster Island area		X	X	X	X	X	X	X
Fill north of SR 520 in Big Bear Creek floodplain			X	X	X	X	X	X
New bridge over Big Bear Creek		X	X	X	X	X		
Modified SR 520 bridge over the Sammamish River, fill in floodplain			X	X	X	X	X	X
Modified HCT bridge over the Sammamish River, fill in floodplain		X	X	X	X	X		

Impacts	Alternative							
	1: No Action	2: S&P, I-90 LRT	3: HOV, I-90 LRT	4: HOV, GP, I-90 LRT	5: HOV, 520 HCT	6: HOV, GP, 520 HCT	7: HOV/BRT	8: HOV/ BRT, GP
Construction Impacts								
Shoreline construction Foster Island and Portage Bay		X	X	X	X	X	X	X
Construction cut and cover tunnel under Ship Canal			X	X		X	X	X
Nearshore construction/over-water work; Lake Washington		X	X	X	X	X	X	X
Construction of aerial structure; Big Bear Creek		X	X	X	X	X		

The impacts summarized in Table 3.3-1 would be difficult or impossible to mitigate and should be avoided, where possible.

3.3.1.1 Alternative 1 (No Action)

The No Action Alternative would not have any new direct impact on fishery resources. Fish passage conditions at the existing culverts would not change and existing PGIS would not be retrofitted with water quality treatment and detention BMPs. Fishery resources would continue to be impacted by these factors.

3.3.1.2 Alternative 2 (Safety & Preservation, I-90 LRT)

Alternative 2 would replace the existing Portage Bay and SR 520 floating bridges, which would increase shading in the shallow water areas of Portage Bay and Foster Island. There would also be some in-water construction impacts in these areas during the removal of existing piers and the installation of new ones. However, the new bridge sections would require fewer support piers, potentially reducing the predator fish habitat.

The LRT facilities would impact the riparian vegetation of Goff and Valley creeks adjacent to SR 520 east of I-405, particularly if a cut-and-cover tunnel is constructed at Goff Creek. A bored tunnel would eliminate these impacts. The LRT structures crossing the Sammamish River, Big Bear Creek, and Valley Creek would result in additional shading to these streams. The LRT would also increase the runoff volumes to the area streams, although the pollutant loading would not increase because the fixed-guideway LRT is non-PGIS.

3.3.1.3 Alternative 3 (SR 520 HOV, I-90 LRT)

Potential impacts on fishery resources for Alternative 3 would be similar to those discussed for Alternative 2. However, the addition of HOV lanes along portions of SR 520 would produce a wider road surface, which would increase the runoff volumes and habitat losses at the stream crossings. Adequate stormwater retention/detention and treatment BMPs would minimize

potential impacts on water quantity/quality in the area streams. Using retaining walls or elevated structures to minimize filling in areas adjacent to streams crossed by the alignment would minimize the loss of habitat.

Alternative 3 includes a cut-and-cover tunnel across the Montlake Cut, resulting in substantial in-water construction that could potentially impact resident fish and migration of adult salmonids returning to the Lake Washington watershed. Restricting in-water construction to the Washington Department of Fish and Wildlife (WDFW)-approved window of time and providing continuous passage routes through the construction area for adult migrants would minimize impacts on anadromous fish.

The wider bridge section through Portage Bay and Foster Island would increase the shading effects in shallow water habitat. Despite the wider bridge section, the number of in-water supporting piers would decrease compared to the existing bridge. Therefore, habitat preferred by predator fish species is expected to decrease.

In addition to new LRT structures over the Sammamish River and Big Bear Creek, Alternative 3 would widen the SR 520 bridge over the Sammamish River and potentially require additional fill in the Big Bear Creek floodplain.

3.3.1.4 Alternative 4 (SR 520 HOV, GP, I-90 LRT)

Potential impacts on fishery resources for Alternative 4 would be similar to those discussed for Alternative 3. However, the addition of HOV and GP lanes along portions of SR 520 would produce a wider road surface, which would increase the runoff volumes and habitat losses at the stream crossings. The wider bridge sections through Portage Bay and Foster Island would increase the shading effects (compared to narrower bridge alternatives), although the number of in-water piers would decrease (compared to existing conditions). To minimize the impacts in the Foster Island area, some of the shallow water habitat could be modified to provide habitat better suited for juvenile salmonids than resident fish. These modifications could include capping the relatively steep-banked muddy shoreline habitat with sand or sand/gravel material to produce gradually sloping beaches.

The increased width proposed by Alternative 4 along the SR 520 corridor would require either extending the existing culverts under the highway, replacing the culverts with structures that improve fish passage (bottomless culvert, bridge, etc.), or supporting the additional width requirements with an aerial structure. However, all of these options would result in some loss of habitat.

3.3.1.5 Alternative 5 (SR 520 HOV, SR 520 HCT)

Potential impacts on fishery resources for Alternative 5 would be similar to those discussed for Alternative 3. However, Alternative 5 would have more impervious surface area along the SR 520 corridor between Lake Washington and I-405, which would increase runoff volumes and habitat losses at the stream crossings. This alternative would have a bored transit tunnel under the Montlake Cut, thereby eliminating a substantial amount of in-water construction work.

3.3.1.6 Alternative 6 (SR 520 HOV, GP, SR 520 HCT)

Potential impacts on fishery resources for Alternative 6 would be similar to those discussed for Alternative 4. However, the inclusion of HCT along the SR 520 corridor would result in the widest impervious surface area between I-5 and 130th Avenue NE of all the alternatives. This would produce the greatest runoff volumes and habitat losses at the stream crossings, as well as the greatest shading impacts in the shallow water habitat in Portage Bay, Foster Island, and Lake Washington.

3.3.1.7 Alternative 7 (SR 520 HOV/BRT)

Potential impacts on fishery resources for Alternative 7 would be similar to those discussed for Alternative 3, except that Alternative 7 would be about 8 feet wider to accommodate the separation between the BRT and the GP lanes. Alternative 7 does not have associated HCT crossings of the Sammamish River and Big Bear Creek, although the SR 520 Sammamish River bridge would be widened and fill would be added to the Big Bear Creek floodplain. This floodplain filling could be avoided by shifting the alignment south of the existing highway.

3.3.1.8 Alternative 8 (SR 520 HOV/BRT, GP)

Except for a slightly wider roadway to accommodate a separation between the GP and BRT lanes, Alternative 8 would have impacts similar to Alternative 4 west of West Lake Sammamish Parkway. East of that point, the impacts would be the same as Alternative 7.

3.3.2 Rating of Alternatives

The multi-modal alternatives were given two ratings: (1) relative impacts and mitigation required for each alternative, and (2) the feasibility of that mitigation. In addition, the alternatives were ranked based on the impacts associated with each alternative and the feasibility of mitigating those impacts. Each alternative was ranked relative to the other alternatives, with 8 being the alternative with the least impact on fish resources, and 1 being the alternative with the most impact. In general, the alternative with the widest typical footprint could potentially have the greatest impact. The typical footprint was used as the primary measure of impacts for the following reasons (in order of importance):

- Wider footprints could potentially have greater direct impacts, such as culvert extensions, loss or modification of instream habitat, and shading, which would be difficult to mitigate;

- Wider footprints would create more total new impervious surface area, which could potentially impact streams through increased downstream erosion and sedimentation;

- Several of the proposed alternatives have approximately the same footprint, but would create different amounts of PGIS. Alternatives that create more PGIS would have greater potential impact on streams and lakes than alternatives that create less PGIS. However,

these impacts could be mitigated through implementation of water quality treatment BMPs.

RATING SCALE

WORST →				BEST
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

Fish-Bearing Streams	**Alternative**							
	1: No Action	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts and Extent of Mitigation Required	4 no	3 least	2 medium	2 medium	3 least	1 most	3 least	3 least
Feasibility of Proposed Mitigation	NA	4 most feasible	2 low feasibility	2 low feasibility	3 medium feasibility	1 least feasible	3 medium feasibility	3 medium feasibility
Ranking	8	7	4	2	3	1	6	5

Avoidance measures identified in the water resources section could also be used to avoid impacts on fishery resources. In addition, impacts on Goff and Valley creeks under Alternatives 2 through 6 could be avoided by crossing Goff Creek with a bored tunnel.

3.4 CRITICAL UPLAND HABITAT/THREATENED AND ENDANGERED SPECIES

Screening Criteria: *A qualitative assessment of potential direct and indirect effects on known, mapped critical upland habitat and listed threatened and endangered species will be prepared. Potential effects will be estimated using data from existing records and professional judgment. Results will be reported by area of habitat affected, along with a qualitative rating that reflects the seriousness and probability of the impacts and potential difficulty in complying with requirements of the Endangered Species Act.*

The analysis includes state sensitive and priority species and habitats, as well as state and federally listed threatened and endangered species, per the request of Washington State Department of Fish and Wildlife (letter to K. Farley from WDFW, February 23, 2001).

3.4.1 Impacts of Each Alternative

The proposed alternatives have many of the same impacts on priority habitat and species (PHS). Most of the alternatives have similar impacts in areas with concentrations of PHS locations (e.g., Portage Bay, Foster Island, Yarrow Bay, and Sammamish/Bear Creek). Alternative 6 would have the greatest overall impacts because it would have the widest configuration. Avoidance, minimization, and mitigation in many of these areas is difficult because the habitat is unique and because shifting the alignment to avoid impacts is often not possible because PHS locations are present on both sides of the proposed alignment.

The significant impacts associated with each alternative are summarized in Table 3.4-1. The impacts summarized in Table 3.4-1 would be difficult or impossible to mitigate and should be avoided, where possible.

3.4.1.1 Alternative 1 (No Action)

The No Action Alternative would not have any new direct impacts on PHS. However, because it was assumed that the existing PGIS would not be retrofitted with water quality treatment and detention BMPs, PHS resources would continue to be indirectly impacted by stormwater runoff.

3.4.1.2 Alternative 2 (Safety & Preservation, I-90 LRT)

Alternative 2 would have long-term, but minor, direct impacts and construction impacts on PHS associated with Portage Bay, Union Bay/Foster Island, and Yarrow Bay. This alternative would include retrofitting SR 520 with water quality treatment BMPs, which means that Alternative 2 would have fewer indirect impacts on PHS than the No Action Alternative.

The I-90 LRT facilities would have significant direct impacts on PHS associated with the Sammamish River and Big Bear Creek at the two proposed crossings.

Table 3.4-1 Summary of Potentially Significant Impacts on PHS

Impacts	Alternative							
	1: No Action	2: S&P, I-90 LRT	3: HOV, I-90 LRT	4: HOV, GP, I-90 LRT	5: HOV, 520 HCT	6: HOV, GP, 520 HCT	7: HOV/BRT	8: HOV/ BRT, GP
Direct								
Fill north of SR 520 in PHS associated with Bear Creek			X	X	X	X	X	X
New bridge over priority habitat at Bear Creek, fill in priority habitat, loss of riparian vegetation, confined channel		X	X	X	X	X		
Direct impacts on PHS from new bridge over the Sammamish River, fill in priority habitat associated with floodplain		X	X	X	X	X		
Direct impacts on PHS at Portage Bay and Foster Island		X	X	X	X	X	X	X
Direct impacts on PHS at Fairweather Bay, Cozy Cove, Yarrow Bay		X	X	X	X	X	X	X
Construction (Indirect Impacts on PHS)								
Shoreline construction Foster Island and Portage Bay			X	X		X	X	X
Construction of cut-and-cover tunnel under Ship Canal			X	X	X	X	X	X
Nearshore construction/over-water work; Lake Washington		X	X	X	X	X	X	X
Construction of a bridge; Sammamish River		X	X	X	X	X		
Modification of SR 520 bridge; Sammamish River		X	X	X	X	X		
Construction of aerial structure; Bear Creek		X	X	X	X	X		

3.4.1.3 Alternative 3 (SR 520 HOV, I-90 LRT)

Potential impacts on PHS for Alternative 3 would be similar to those discussed for Alternative 2. However, the addition of HOV lanes along SR 520 would have more direct impacts on PHS associated with Portage Bay, Union Bay/Foster Island, and Cozy Cove/Yarrow Bay and would also include direct impacts on PHS associated with Bear Creek. Alternative 3 would include construction of a cut-and-cover tunnel under the Montlake Cut, which would have significant temporary water quality impacts and potential indirect impacts on PHS. This alternative would have minor indirect impacts on PHS downstream of Kelsey and Goff Creeks.

The I-90 LRT facilities would have the same impacts on PHS associated with the Sammamish River and Big Bear Creek as described for Alternative 2.

3.4.1.4 Alternative 4 (SR 520 HOV, GP, I-90 LRT)

Alternative 4 would include the addition of HOV and GP lanes along portions of SR 520, and would have similar, but greater, direct impacts on PHS associated with Portage Bay, Union Bay/Foster Island, Cozy Cove/Yarrow Bay, and Bear Creek than Alternative 3. Alternative 4 would include construction of a cut-and-cover tunnel under the Montlake Cut, which would have significant temporary water quality impacts and potential indirect impacts on PHS, similar to Alternative 3. Alternative 4 would also have similar, but slightly greater, indirect impacts on PHS downstream of Kelsey and Goff Creeks as compared to Alternative 3.

The I-90 LRT facilities for Alternative 4 would have the same impacts on PHS associated with the Sammamish River and Big Bear Creek as described for Alternative 2.

3.4.1.5 Alternative 5 (SR 520 HOV, SR 520 HCT)

Potential impacts on PHS for Alternative 5 would be similar to those described for Alternative 3. However, Alternative 5 would include additional impacts on PHS from HCT facilities located in Union Bay/Foster Island and Cozy Cove/Yarrow Bay.

Alternative 5 would not include construction of a cut-and-cover tunnel under the Montlake Cut, and, therefore, would not have significant temporary water quality impacts and potential indirect impacts on PHS.

This alternative would have similar, but slightly greater, indirect impacts on PHS downstream of Kelsey and Goff Creeks compared to Alternative 4.

The HCT facilities would have the same impacts on PHS associated with the Sammamish River and Big Bear Creek as Alternative 2.

3.4.1.6 Alternative 6 (SR 520 HOV, GP, SR 520 HCT)

Alternative 6 would have the greatest direct impacts on PHS because it would have the widest footprint across Portage Bay, Union Bay/Foster Island, Cozy Cove/Yarrow Bay, and Bear Creek.

Alternative 6 would have the greatest long-term indirect impacts on PHS associated with changes in water quality and hydrology due to increased area of impervious surface and pollutant loading. Alternative 6 would include construction of a cut-and-cover tunnel under the Montlake Cut, which would have significant temporary water quality impacts and potential indirect impacts on PHS.

The HCT facilities would have significant impacts on PHS associated with the Sammamish River and Big Bear Creek at the two proposed crossings.

3.4.1.7 Alternative 7 (SR 520 HOV/BRT)

Alternative 7 would have direct and indirect impacts on PHS associated with Portage Bay, Union Bay/Foster Island, Cozy Cove/Yarrow Bay, and Bear Creek that are similar, but slightly greater, than those under Alternative 3.

For Alternative 7, long-term indirect impacts on PHS associated with changes in water quality and hydrology due to increased impervious surface area and pollutant loading would be similar to, but greater than, those associated with Alternative 3.

Alternative 7 would not include HCT crossings of the Sammamish River and Bear Creek and would avoid the impacts on PHS at these locations.

3.4.1.8 Alternative 8 (SR 520 HOV/BRT, GP)

Alternative 8 would result in similar, but slightly greater (due to wider footprint), direct and indirect impacts on PHS compared to those of Alternative 7.

Alternative 8 does not include HCT crossings of the Sammamish River and Bear Creek and would avoid the impacts on PHS at these locations.

3.4.2 Ratings of Alternatives

Alternatives 4, 6, and 8 would have wider footprints and would potentially have the most significant impacts on PHS.

The multi-modal alternatives were given two ratings: (1) relative impacts and mitigation required for each alternative, and (2) the feasibility of that mitigation. In addition, the alternatives were ranked based on the impacts associated with each alternative and the feasibility of mitigating those impacts. Each alternative was ranked relative to the other alternatives, with the ranking of 8 being the alternative with the least impacts on PHS, and the ranking of 1 being the alternative with the most impacts. In general, the alternative with the widest typical footprint would have the greatest impact.

RATING SCALE

WORST → BEST				
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

Critical Upland Habitat	**Alternative**							
	1: No Action	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts and Extent of Mitigation Required	3 least	2 medium	2 medium	1 most	2 medium	1 most	2 medium	1 most
Feasibility of Proposed Mitigation	NA	3 medium feasibility	2 low feasibility	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible
Ranking	8	7	6	2	3	1	5	4

3.5 WETLANDS AND SHORELINES

Screening Criteria: *A preliminary quantitative estimate of potential direct effects on known, mapped wetlands and shorelines will be developed. The project effects will be enumerated by area and type of wetland affected (using currently available wetlands mapping), with qualitative evaluation of likely functional impacts. A broad-level analysis of habitat connectivity issues for non-ESA-listed species within the study area will also be included.*

3.5.1 Impacts of Each Alternative

Table 3.5-1 summarizes the approximate wetland impacts associated with each alternative.

Table 3.5-1 Estimated Wetland Impacts Summary [a,b] (in Acres), by Alternative

	Alternative [c]							
Wetland Category[d]	**1: No Action**	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Category I	0	3.7	5.9	7.8	6.9	10.3	6.6	7.7
Category II	0	0	1.4	1.4	1.4	1.4	1.4	1.4
Category III	0	0.9	8.4	8.2	8.3	9.6	8.3	8.2
Category IV	0	0	1.0	0.4	1.0	0.4	0.9	0.3
Total	**0**	**4.6**	**16.7**	**17.8**	**17.6**	**21.7**	**17.2**	**17.6**

[a] All areas estimated from aerial photographs, USFWS National Wetland Inventory Maps, and Local Wetland Inventory Maps. Field investigations have only been performed along the SR 520 corridor. Impact footprints are based on preliminary design and do not reflect the limits of actual cut and fill.

[b] Calculated areas do not include unvegetated aquatic areas. These areas are not regulated as wetlands, but may still be regulated under Sections 401 and 404 of the CWA, Section 10 of the Rivers and Harbors Act, and HPA.

[c] Impact calculations for Alternatives 2 through 6 do not include HCT impacts on the Sammamish River and Bear Creek that would occur outside the SR 520 right-of-way.

[d] Ecology (1993). Category I is the highest quality classification of wetlands.

3.5.1.1 Alternative 1 (No Action)

The No Action Alternative does not propose any new construction. As a result, no new environmental impacts would be expected.

3.5.1.2 Alternative 2 (Safety & Preservation, I-90 LRT)

Alternative 2 would have the second least impacts, although the impacts themselves would be considered high. Impacts on the wetlands associated with Portage Bay and Union Bay would cover a greater area than those proposed under Alternatives 3 and 7, but the overall area of

impact would be by far the smallest (4.7 acres). There would be no impacts associated with the mitigation site at Yarrow Bay Creek. It might be feasible to mitigate the potential impacts on the other wetlands between Lake Washington and I-405. The impacts on the Sammamish River/Bear Creek area would be considered high, but would affect a small area.

The proposed HOV crossings of the Sammamish River and Bear Creek could be moved to existing structures or to the south side of SR 520.

The proposed LRT alignment for Alternative 2 would cross Lake Washington on the existing I-90 bridge and would not impact wetlands or shorelines in Seattle or Lake Washington. The alignment would be placed on the west side of Bellevue Way/112th to avoid impacts on Mercer Slough. There would be impacts in the Redmond area related to the new crossing of the Sammamish River and Bear Creek. Both of these streams are waters of statewide significance and have associated Category I wetlands. While the area of impact would be small, it would be very difficult to mitigate. Therefore, the impact would be considered high. These impacts would occur outside the area that was field verified, and are not included in the calculated impacts shown in Table 3.5-1.

3.5.1.3 Alternative 3 (SR 520 HOV, I-90 LRT)

Alternative 3 would have the third least impacts. Impacts in the Portage Bay/Union Bay area would be the smallest of any of the build alternatives, but there would be substantial impacts to wetlands associated with Yarrow Bay Creek, the Sammamish River, and Bear Creek. Because these wetlands provide unique ecological functions and are of sociocultural value, mitigation would be very difficult. The total area of wetland impact would be approximately 16.7 acres, and the overall impact rating would be high. Impacts from the LRT would be the same as those described for Alternative 2.

Recommendations for avoiding or minimizing impacts would be the same as those noted for Alternative 2.

3.5.1.4 Alternative 4 (SR 520 HOV, GP, I-90 LRT)

Alternative 4 would have the second most impacts. Impacts associated with this alternative would be similar to those described for Alternative 3 (high), but the total area of wetland impact would be larger, approximately 17.8 acres. Impacts from the LRT would be the same as those described for Alternative 2.

Recommendations for avoiding or minimizing impacts would be the same as those noted for Alternative 2.

3.5.1.5 Alternative 5 (SR 520 HOV, SR 520 HCT)

Alternative 5 would have the most impacts of the six-lane alternatives. Impacts associated with this alternative would be similar to those described for Alternative 3, but the total area of wetland

impact would be larger, approximately 17.6 acres. Impacts on the Sammamish River and Bear Creek from the HCT alignment would be the same as those described for Alternative 2.

Recommendations for avoiding or minimizing impacts would be the same as those noted for Alternative 2.

3.5.1.6 Alternative 6 (SR 520 HOV, GP, SR 520 HCT)

Alternative 6 would have the greatest impacts of all of the alternatives. The wider footprint contributes to the greater impact. The impacts on wetlands associated with Portage Bay, Union Bay, Yarrow Bay Creek, the Sammamish River, and Bear Creek would be high and would be difficult to mitigate. Impacts from the HCT would be the same as those described for Alternative 5.

Recommendations for avoiding or minimizing impacts would be the same as those noted for Alternative 2.

3.5.1.7 Alternative 7 (SR 520 HOV/BRT)

Impacts associated with this alternative would be similar to those described for Alternative 3 (high), but the total area of wetland impact would be larger, approximately 17.2 acres.

Recommendations for avoiding or minimizing impacts would be the same as those noted for Alternative 2.

3.5.1.8 Alternative 8 (SR 520 HOV/BRT, GP)

Alternative 8 would have the third greatest impacts, after Alternatives 4 and 6. Impacts associated with this alternative would be similar to those described for Alternative 3 (high), but the total area of Category I wetlands impact would be larger, approximately 7.7 acres.

Recommendations for avoiding or minimizing impacts would be the same as those noted for Alternative 2.

3.5.2 Rating of Alternatives

The eight-lane alternatives (Alternatives 4, 6, and 8) would have the greatest impacts on wetlands and shorelines, with Alternative 6 having the greatest impacts of all. Of the six-lane alternatives, Alternative 5 would have the greatest impacts.

The multi-modal alternatives were given two ratings: (1) relative impacts and the mitigation required for each alternative, and (2) the feasibility of that mitigation. In addition, the alternatives were ranked based on the impacts associated with each alternative and the feasibility of mitigating those impacts. Each alternative was ranked relative to the other alternatives with a ranking of 8 being the alternative with the least impacts on wetlands and shorelines, and a ranking of 1 being the alternative with the most impacts. In general, the alternative with the widest typical footprint would have the greatest impact.

RATING SCALE

WORST → BEST				
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

	Alternative							
Wetlands and Shorelines	**1: No Action**	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts and Extent of Mitigation Required	4 no	2 medium	1 most	1 most	1 most	1 most	1 most	1 most
Feasibility of Proposed Mitigation	NA	2 low feasibility	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible
Ranking	8	7	6	2	4	1	5	3

3.6 NOISE AND VIBRATION

Screening Criteria: *A qualitative screening-level analysis of potential effects of noise and vibration from operations will be conducted for selected neighborhoods and other known sensitive receptors that have the potential to be more seriously affected. Professional judgment and rules of thumb will be applied to identify the potential for substantial increases in noise and vibration based on estimated changes in traffic volumes and changes in proximity of noise and vibration sources to receptors.*

3.6.1 Impacts of Each Alternative

The change in the number of traffic noise impacts and noise levels between the alternatives is determined by the amount of roadway widening and projected traffic volumes. The combination of moving the roadway closer to the receivers during widening and allowing for additional traffic volumes would result in the highest noise levels and potential impacts. It should also be noted, however, that under the worst-case scenarios, Alternatives 4 and 8, noise levels are projected to increase by approximately 3 to 5 dBA, and to most people a 3 dBA change is barely perceptible, while a 5 dBA is usually noticeable.

The differences among the HCT alternatives are not expected to make a significant difference in the noise or vibration impacts. The alternatives along SR 520 and I-90 are in established transportation corridors, and, therefore, are not projected to change the noise environment significantly. Alignments that would remain along SR 520 would have less potential for impacts than those alignments along Bellevue Way and 112th Avenue NE.

There are several methods of noise mitigation and design options currently under consideration for this project. Design methods such as noise walls, depressed roadways for traffic alignments, and minimum tunnel depths of 75 feet for HCT alignments would substantially reduce noise and vibration levels and impacts throughout the corridor. It is expected that noise levels could be reduced by as much as 8 to 12 dBA for all build alternatives that are projected to have noise impacts. This would reduce noise levels to less than existing conditions along the SR 520 corridor. In addition, mitigation measures for HCT alignments, such as noise walls, could reduce noise levels by as much as 6 to 12 dBA.

3.6.1.1 Alternative 1 (No Action)

Under the No Action Alternative, noise levels would remain at or above the current levels. No roadway work would be performed, and, therefore, no mitigation would be performed. At some point, WSDOT could add the impacted areas to the Type II retrofit list, and noise mitigation could be performed. Existing noise levels within the SR 520 corridor are greater than the noise threshold that would require mitigation, if SR 520 were built today.

Table 3.6-1 Estimated Residential Noise Levels and Impacts
(Unshielded structures within 400 feet of SR 520/HCT corridor right-of-ways)

	Before Mitigation[1,2]				After Mitigation[2,3]			
	Noise Levels[4]		Number of Impacts		Noise Levels[4]		Number of Impacts	
Alternative	SR 520	HCT	SR 520	HCT	SR 520	HCT	SR 520[5]	HCT
1: No Action	65–78	N/A[6]	440–535	N/A[6]	--[7]	--[6,7]	--[7]	--[6,7]
2: S&P, I-90 LRT	65–78	43–56	440–535	<50	59–68	43–56	<50	None
3: HOV, I-90 LRT	65–78	43–56	595–710	<50	59–68	43–56	<50	None
4: HOV, GP, I-90 LRT	65–78	43–56	630–750	<50	59–68	43–56	<50	None
5: HOV, 520 HCT	66–79	51–66	595–710	NA	59–68	41–56	<50	None
6: HOV, GP, 520 HCT	67–80	51–66	630–750	NA	59–68	41–56	<50	None
7: HOV/BRT	65–78	NA	595–710	NA	59–68	NA	<50	None
8: HOV/ BRT, GP	66–79	NA	630–750	NA	59–68	NA	<50	None

1 Worst-case assumptions: no lidded highways or other special noise-reducing design options considered.

2 Estimated impacts and noise levels for residential land use within 400 feet of the SR 520 and HCT corridors.

3 Mitigation measures include noise walls and berms for traffic, and noise walls, berms, and sound insulation for HCT.

4 Traffic noise levels are given in peak-hour L_{eq}; HCT noise levels are given in 24-hour L_{dn}.

5 Limited residual traffic noise impacts would be projected near main arterial roads for all alternatives.

6 N/A = Not applicable to this alternative.

7 If SR 520 is not changed, then areas exceeding the impact criteria may be added to the Type II noise abatement retrofit program. However, because there is no project with the No Action Alternative, no mitigation would be proposed.

3.6.1.2 Alternative 2 (Safety & Preservation, I-90 LRT)

Alternative 2 would have the same noise levels in most areas, with only slight increases in some areas due to roadway realignment and traffic increases. With mitigation, noise levels in virtually all areas could be reduced to within the WSDOT traffic noise criteria.

Mitigation for the LRT portions of the alternative might require noise walls and some residential sound insulation. No major LRT-related vibration problems would be projected.

3.6.1.3 Alternative 3 (SR 520 HOV, I-90 LRT)

Alternative 3 would result in noise and vibration impacts similar to those described under Alternative 2. Alternative 3 would include the addition of HOV lanes to portions of SR 520, thereby the noise source would be closer to sensitive receptors, and would result in a greater number of impacts prior to mitigation.

3.6.1.4 Alternative 4 (SR 520 HOV, GP, I-90 LRT)

Alternative 4 would result in noise and vibration impacts similar to those described under Alternative 2. However, Alternative 4 would have a greater number of impacts before mitigation because this alternative would add HOV and GP lanes to SR 520, would move the noise source closer to sensitive receptors.

3.6.1.5 Alternative 5 (SR 520 HOV, SR 520 HCT)

Alternative 5 would result in noise and vibration impacts similar to those described under Alternative 2. This alternative would include addition of HOV lanes to portions of SR 520, and would impact the same number of sensitive receptors as Alternative 3. However, the HCT alignment would follow SR 520 west of I-405. Therefore, Alternative 5 would impact more sensitive receptors than Alternative 3.

3.6.1.6 Alternative 6 (SR 520 HOV, GP, SR 520 HCT)

Alternative 6 would result in noise and vibration impacts that would be similar, but slightly higher than, those described under Alternative 2. This alternative would impact a similar number of sensitive receptors as Alternative 4.

3.6.1.7 Alternative 7 (SR 520 HOV/BRT)

Alternative 7 would have the same general impacts as Alternative 3. Alternative 7 would not have noise and vibration impacts from HCT. However, traffic noise from the SR 520 corridor would be the primary noise impact, and, therefore, the difference between Alternatives 3 and 7 would be minimal.

3.6.1.8 Alternative 8 (SR 520 HOV/BRT, GP)

Alternative 8 has the same general impacts as Alternative 7, but would impact a greater number of sensitive receptors due to the wider footprint.

3.6.2 Rating of Alternatives

As shown in Table 3.6-1, the noise and vibration impacts of Alternatives 2 through 7 would be similar. Alternatives with the widest footprints (Alternatives 4, 6, and 8) would move the noise source closer to sensitive receptors, and would, therefore, impact the greatest number of sensitive receptors before mitigation. After mitigation, all build alternatives would have similar noise levels.

The multi-modal alternatives were given two ratings: (1) relative impacts and the mitigation required for each alternative, and (2) the feasibility of that mitigation. In addition, the alternatives were ranked based on the impacts associated with each alternative and the feasibility of mitigating those impacts. Each alternative was ranked relative to the other alternatives with a ranking of 8 being the alternative with the least noise and vibration impacts, and a ranking of 1 being the alternative with the most impacts. In general, the alternative with the widest typical footprint would have the greatest impact.

RATING SCALE

WORST → BEST				
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

	Alternative							
Noise and Vibration	**1: No Action**	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts Before Mitigation	3 least	3 least	2 medium	1 most	2 medium	1 most	2 medium	1 most
Impacts After Mitigation	NA	3 least	3 least	3 least	3 least	3 least	3 least	3 least
Feasibility of Proposed Mitigation	NA	2 low feasibility	2 low feasibility	2 low feasibility	2 low feasibility	2 low feasibility	3 medium feasibility	3 medium feasibility
Ranking	8	7	5	3	4	1	6	2

3.7 LAND USE

Screening Criteria: *A qualitative analysis has been done to examine the direct and indirect effects of each alternative on the pattern of growth in the study area and consistency with regional and local land use plans.*

3.7.1 Impacts of Each Alternative

The following analysis considers the potential impacts on land uses along the corridor due to the construction and operation at the facility. Direct impacts would include the effects of property acquisition, loss of access, and other physical changes to land uses. Indirect impacts reflect the potential that other impacts such as increased noise, air quality degradation, traffic, or visual changes would have on land uses.

Table 3.7-1 presents a comparison of direct impacts for the alternatives. When combined, public and vacant lands compose the majority of acreage required for any of the alternatives. Of the developed private land uses, mostly commercial property would be affected, followed by industrial land. Direct impacts on residential uses would primarily occur within the Medina and Bellevue areas.

Table 3.7-1 Comparison of Estimated Direct Land Use Impacts in Acres[a]

	Alternatives							
Existing Land Use Type	**1: No Action**	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Single-Family Residential	0.0	2.7	3.8	6.8	2.7	4.2	3.3	5.8
Multi-Family Residential	0.0	0.1	0.3	1.1	0.7	0.5	1.1	1.4
Commercial	0.0	8.9	13.5	28.4	18.9	26.6	7.3	18.4
Industrial	0.0	2.9	4.6	7.7	6.4	9.1	1.4	4.5
Public[b]	0.0	11.7	18.6	16.4	23.6	26.2	14.8	16.5
Other[c]	0.0	0.2	0.4	1.4	0.2	0	0.2	0.8
Vacant	0.0	6.9	11.6	14.6	14.9	19.6	8.8	10.1
Total	**0.0**	**33.4**	**52.8**	**76.4**	**67.4**	**86.2**	**36.9**	**57.5**
Percent Outside SR 520 Corridor[d]	**--**	**45%**	**28%**	**21%**	**36%**	**28%**	**0**	**0**

[a] Acreage is shown to the tenth place by land use in order to show a complete range of potential impacts; however, these numbers only represent gross estimates based on potential alignments, and will be further refined in the EIS phase.

[b] Public includes all lands that are publicly owned, such as parks, universities, government land, etc.

[c] Other includes religious institutions.

[d] Alternatives 7 and 8 would only deviate from the highway in alignment and would directly impact only a minimal amount of property.

3.7.1.1 Alternative 1 (No Action)

The No Action Alternative would have no direct or indirect impacts. This alternative would be inconsistent with the transportation policies of many jurisdictions because it could encourage traffic to seek alternative routes on lesser arterials. The No Action Alternative would also fail to support communities' transit policies. No mitigation is proposed.

3.7.1.2 Alternative 2 (Safety & Preservation, I-90 LRT)

Alternative 2 would have the least direct impacts. This alternative would be both consistent and inconsistent with local comprehensive plan policies. It would be inconsistent in that it might not provide adequate capacity on SR 520. It would be consistent with regional, Bellevue, Seattle, Mercer Island, and Redmond transit policies, but would not address Medina's policies and would not fulfill Seattle's desire to connect its neighborhood centers.

Direct impacts resulting from elevated and at-grade LRT facilities could be minimized by placing structures in the existing right-of-way.

3.7.1.3 Alternative 3 (SR 520 HOV, I-90 LRT)

Alternative 3 would have low direct and indirect impacts. This alternative would be both consistent and inconsistent with local comprehensive plan policies. The proposed highway facilities would be consistent with Seattle and Medina Comprehensive Plans. It could be inconsistent with the City of Bellevue policies regarding adequate GP capacity and cut-through traffic. The Alternative 3 LRT alignment would have the same high level of consistency with regional and local plans as Alternative 2. Direct impacts resulting from elevated and at-grade LRT facilities could be minimized by placing them in the existing right-of-way.

3.7.1.4 Alternative 4 (SR 520 HOV, GP, I-90 LRT)

Alternative 4 would have the second highest direct impacts of the multi-modal alternatives. Primarily commercial land would be affected. Indirect impacts would mostly be the intensification of commercial development around certain interchanges. For the most part this development would be consistent or would not conflict with local comprehensive plans. Like Alternatives 2 and 3, Alternative 4 would have a high level of consistency with regional and local transit policies.

3.7.1.5 Alternative 5 (SR 520 HOV, SR 520 HCT)

Direct land use impacts from Alternative 5 would be moderate. Indirect impacts would be minimal. Alternative 5 would have HCT on SR 520, as opposed to regional plans that include HCT on I-90. While this would be inconsistent for the location of HCT, HCT on SR 520 would serve many of the same goals and objectives of regional plans. This alternative would be consistent and inconsistent with local comprehensive plan policies. Alternative 5 would not increase GP capacity, which would be consistent with Seattle and Medina Comprehensive Plan policies but inconsistent with Bellevue policy. Alternative 5 would provide onramps and

offramps to the Overlake Advanced Technology Center, which would be consistent with Redmond policies. In terms of transit policy, Alternative 5 would be consistent with Seattle, Medina, and Redmond policies. It would not fulfill Bellevue's stated desire to connect its neighborhoods with HCT as well as Alternatives 2, 3, and 4 would.

Mitigation would be similar to the other alternatives: use the existing right-of-way for highway improvements as much as possible, and keep HCT facilities in existing right-of-way where possible.

3.7.1.6 Alternative 6 (SR 520 HOV, GP, SR 520 HCT)

Alternative 6 would have the greatest direct and indirect impacts. Primarily commercial land would be affected. Indirect impacts would mostly be the intensification of commercial development around certain interchanges. For the most part this development would be consistent or would not conflict with local comprehensive plans. Like Alternative 5, the HCT alignment would be mostly consistent with regional, Seattle, Medina, and Redmond policies, but would not fulfill Bellevue's stated desire to connect its neighborhood with HCT as well as Alternatives 2, 3, and 4.

3.7.1.7 Alternative 7 (SR 520 HOV/BRT)

Alternative 7 would have low direct and indirect impacts. Alternative 7 in the Montlake area could be inconsistent with Seattle plans and policies. By emphasizing HOV facilities, Alternative 7 would be consistent with Seattle and Medina Comprehensive Plan policies, but inconsistent with those of Bellevue. The HCT facilities would be consistent with regional and local policies, except that direct access to transit would not be provided at the Overlake Advanced Technology Center, as envisioned by the Redmond Comprehensive Plan. In addition, Alternative 7 would not meet long-term transit capacity requirements in downtown Seattle.

3.7.1.8 Alternative 8 (SR 520 HOV/BRT, GP)

The direct impacts resulting from Alternative 8 would be moderate. Indirect impacts would mostly be the intensification of commercial development around certain interchanges. For the most part this development would be consistent or would not conflict with local comprehensive plans. The HCT facilities would be consistent with regional and local policies, except that direct access to transit would not be provided at the Overlake Advanced Technology Center, as envisioned by the Redmond Comprehensive Plan.

3.7.2 Rating of Alternatives

Alternative 6, which would have eight lanes and a fixed HCT guideway, would have the greatest direct impact of all the alternatives by requiring acquisition of more than 86 acres of land. Alternative 4, which would also have eight lanes but a different fixed HCT guideway alignment, would require approximately 76 acres of land. Even though Alternative 5 would only accommodate six lanes and includes a fixed HCT guideway, it would require approximately 67 acres; this would be a greater impact than Alternative 8 (approximately 57 acres), which

would be an eight-lane highway facility incorporating HCT through shared HOV/BRT lanes and flyer stops. Alternative 3 would have a direct impact on land uses comparable to Alternative 8, by requiring approximately 52 acres of land for right-of-way. Finally, Alternatives 2 and 7 would have comparable direct impacts. Alternative 2 would require approximately 33 acres and Alternative 7 would need approximately 37 acres.

The multi-modal alternatives were given two ratings: (1) relative impacts and mitigation required for each alternative, and (2) the feasibility of that mitigation. In addition, the alternatives were ranked based on the impacts associated with each alternative and the feasibility of mitigating those impacts. Each alternative was ranked relative to the other alternatives with 8 being the alternative with the least land use impacts, and 1 being the alternative with the most impacts. In general, the alternative with the widest typical footprint would have the greatest impact.

RATING SCALE

WORST → BEST				
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

Land Use	**Alternative**							
	1: No Action	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts and Extent of Mitigation Required	4 no	3 least	3 least	2 medium	2 medium	1 most	3 least	2 medium
Feasibility of Proposed Mitigation	NA	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible
Ranking	8	7	5	2	3	1	6	4

3.8 PARKLANDS

Screening Criteria: *A qualitative analysis of potential impacts on known Section 4(f) resources, including publicly owned parks, trails, and recreation areas and wildlife and waterfowl refuges.*

3.8.1 Impacts of Each Alternative

All potential impacts on parklands would occur within the SR 520 corridor. Any park impact that could not be avoided would be subject to evaluation under the guidelines of Section 4(f) of the U.S. Department of Transportation Act of 1966. As part of Section 4(f) Evaluation, avoidance alternatives would need to be considered and selected if found to be feasible and prudent. The potentially significant impacts associated with each alternative are summarized in Table 3.8-1.

3.8.1.1 Alternative 1 (No Action)

No parklands would be impacted under the No Action Alternative.

3.8.1.2 Alternative 2 (Safety & Preservation, I-90 LRT)

Alternative 2 would result in the fewest direct impacts (9) affecting the fewest distinct park facilities (Bagley Viewpoint, McCurdy Park, East Montlake Park, Washington Park, Fairweather Nature Preserve, Points Loop Trail, SR 520 Trail, Sammamish River Park and Trail, and Town Center Open Space and Trail). Six of the nine direct impacts are related to proposed highway improvements along SR 520, whereas the remaining three direct impacts are associated with the LRT alignment.

3.8.1.3 Alternative 3 (SR 520 HOV, I-90 LRT)

Alternative 3 would result in 15 direct impacts affecting 11 distinct park facilities (10th Avenue East and East Roanoke Street Park, Bagley Viewpoint, Montlake Bike Path, McCurdy Park, East Montlake Park, Washington Park, Fairweather Nature Preserve, Points Loop Trail, SR 520 Trail, Sammamish River Park and Trail, and Town Center Open Space and Trail). Twelve of the 15 direct impacts are related to proposed highway improvements, whereas the remaining three direct impacts are associated with the LRT alignment.

3.8.1.4 Alternative 4 (SR 520 HOV, GP, I-90 LRT)

Alternative 4 would result in 16 direct impacts affecting 12 distinct park facilities (in addition to the impacted parklands listed above in Alternative 3, the I-5 Open Space between I-5 and South Lake Union would be affected). Thirteen of the 16 direct impacts are related to proposed highway improvements, whereas the remaining three direct impacts are associated with the LRT alignment.

Table 3.8-1 Summary of Potential Impacts on Parklands

Area of Impacts (in acres)	Alternative							
	1: No Action	2: S&P, I-90 LRT	3: HOV, I-90 LRT	4: HOV, GP, I-90 LRT	5: HOV, 520 HCT	6: HOV, GP, 520 HCT	7: HOV/BRT	8: HOV/ BRT, GP
Direct Impacts								
I-5 Open Space				X[a]			X	X
10th Avenue East and Roanoke Street Park			0.2	0.2	0.1	0.1	0.3	0.3
Bagley Viewpoint		0.004	0.03	0.08	0.03	0.03	0.14	0.1
Montlake Bike Path			X	X	X	X	X	X
McCurdy Park		0.6	1.5	1.5	1.5	1.5	1.5	1.5
East Montlake Park		0.2	1.2	1.4	0.3	0.9	0.8	1.6
Washington Park / Arboretum		2.5	0.9	2.3	2.1	3.5	1.1	1.6
Fairweather Nature Preserve		0.1	0.1	0.3		0.4		0.3
Points Loop Trail		X	X	X	X	X	X	X
SR 520 Trail		X[c]	X[c]	X[c]	X[c]	X[c]	X	X
Sammamish River Park and Trail		X	X	X	X	X		
Town Center Open Space and Trail		X	X	X	X	X		
Proximity Impacts (Potential Constructive Use)								
BNSFRR Right-of-Way Path					X	X		
Total Number of Park Facilities	**0**	**9**	**11**	**12**	**11**	**12**	**9**	**10**
Total Number of Impacts	**0**	**9**	**15**	**16**	**12**	**15**	**11**	**12**
Range of Area of Impact, in Acres [b]	**0**	**3.0-3.5**	**3.5-4.0**	**5.6-6.0**	**4.0-4.4**	**6.1-6.5**	**3.4-3.9**	**5.1-5.5**

[a] Trail is impacted by alternative; however, the area is too small to calculate at this level of analysis.

[b] Does not include trails or paths.

[c] Highway improvements would cause direct impact to trail. HCT alignment would cause either direct or proximity impact to trail.

3.8.1.5 Alternative 5 (SR 520 HOV, SR 520 HCT)

Alternative 5 would result in 12 direct impacts affecting 11 distinct park facilities (the same parks listed above in Alternative 3). In addition, a proximity impact in the proposed BNSFRR right-of-way could be considered a constructive use. Nine of the 12 direct impacts are related to proposed highway improvements, whereas the remaining three direct impacts are associated with the HCT alignment.

3.8.1.6 Alternative 6 (SR 520 HOV, GP, SR 520 HCT)

Alternative 6 would result in 15 direct impacts affecting 11 distinct park facilities (the same parks as noted in Alternative 5, including the possible constructive use of the proposed BNSFRR right-of-way). Twelve of the 15 direct impacts are related to proposed highway improvements, whereas the remaining three direct impacts are associated with the HCT alignment.

3.8.1.7 Alternative 7 (SR 520 HOV/BRT)

Alternative 7 would result in 11 direct impacts affecting 9 distinct park facilities (I-5 Open Space, 10th Avenue East and East Roanoke Street Park, Bagley Viewpoint, Montlake Bike Path, McCurdy Park, East Montlake Park, Washington Park, Points Loop Trail, and the SR 520 Trail). All 11 direct impacts are related to proposed highway improvements.

3.8.1.8 Alternative 8 (SR 520 HOV/BRT, GP)

Alternative 8 would result in 12 direct impacts affecting 10 distinct park facilities (the same facilities noted above in Alternative 7, plus Fairweather Nature Preserve). All 12 direct impacts are related to proposed highway improvements.

3.8.2 Rating of Alternatives

The comparative rating of the alternatives below is based on the number of direct impacts, possible constructive use, and affected park facilities. As noted, Alternative 2 has the lowest level of impacts; Alternatives 5, 7, and 8 have a medium level of impacts; and Alternatives 3, 4, and 6 have the most impacts. The ranking of the alternatives is based on a nonquantitative approach that incorporates both the number of potential impacts and the magnitude of the impacts (depicted as the total acreage of parkland affected by each alternative).

The multi-modal alternatives were given two ratings: (1) relative impacts and mitigation required for each alternative, (2) and the feasibility of that mitigation. In addition, the alternatives were ranked based on the impacts associated with each alternative and the feasibility of mitigating those impacts. Each alternative was ranked relative to the other alternatives with 8 being the alternative with the least impacts on parklands, and 1 being the alternative with the most impacts. In general, the alternative with the widest typical footprint would have the greatest impact.

RATING SCALE

WORST → BEST				
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

Parklands	**Alternative**							
	1: No Action	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts and Extent of Mitigation Required	4 no	3 least	2 medium	1 most	2 medium	1 most	3 least	2 medium
Feasibility of Proposed Mitigation	NA	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible
Ranking	8	7	4	2	5	1	6	3

3.9 CULTURAL RESOURCES

Screening Criteria: *Section 106 resources to be evaluated include recorded historic districts, buildings, objects, and archaeological sites.*

3.9.1 Impacts of Each Alternative

During the EIS phase, any Section 106 resources potentially impacted by any of the project alternatives will be evaluated to have one of three possible determinations: no effect, no adverse effect, or adverse effect. A no effect determination would be used if the project alternative was not close to a historic property and construction would have no effect on the property. A no adverse effect determination would be used if the project alternative would have an effect on a historic property, but would not diminish the historical qualities of the property. It is likely that most of the potential impacts identified in this second level screening phase could receive either a no effect or no adverse effect determination.

All of the potential impacts on cultural resources that are located outside the SR 520 corridor are due to the HCT alignments. The potentially significant impacts associated with each alternative are summarized in Table 3.9-1.

Table 3.9-1 Summary of Potential Cultural Resources Impacts

	Alternative							
Potential Impacts	**1: No Action**	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
SR 520 Corridor Impacts								
Seward School				X		X		
Arboretum Sewage Trestle					X	X	X	X
Montlake Bridge			X		X	X	X	X
Outside SR 520 Corridor Impacts (HCT Only)								
Mount Baker Ridge Tunnel		X	X	X				
Pioneer Square Historic District		X	X	X				
Frederick W. Winters House		X	X	X				
Total Potential Number of Cultural Resources Impacted	0	3	4	4	2	3	2	2

3.9.1.1 Alternative 1 (No Action)

No impacts on cultural resources other than those associated with normal wear, maintenance, or lack of maintenance are expected from the No Action Alternative.

3.9.1.2 Alternative 2 (Safety and Preservation, I-90 LRT)

Alternative 2 would have potential direct or indirect impacts on three previously recorded cultural resources due to the I-90 LRT alignment: the Mount Baker Ridge Tunnel on I-90, the Pioneer Square Historic District, and the Frederick W. Winters House on Bellevue Way.

3.9.1.3 Alternative 3 (SR 520 HOV, I-90 LRT)

Alternative 3 would have potential direct or indirect impacts on four previously recorded cultural resources. In addition to the resources impacted under Alternative 2, Alternative 3 would also potentially impact the Montlake Bridge due to highway improvements.

3.9.1.4 Alternative 4 (SR 520 HOV, GP, I-90 LRT)

Alternative 4 would have the same potential direct or indirect impacts as Alternative 2, plus a potential impact to the Seward School in Eastlake due to highway improvements.

3.9.1.5 Alternative 5 (SR 520 HOV, SR 520 HCT)

Alternative 5 could have potential direct or indirect impacts on two previously recorded cultural resources: the Montlake Bridge and the Arboretum Sewage Trestle located on Lake Washington Boulevard.

3.9.1.6 Alternative 6 (SR 520 HOV, GP, SR 520 HCT)

Alternative 6 would have potential direct or indirect impacts on three previously recorded cultural resources: the Montlake Bridge, the Seward School in Eastlake, and the Arboretum Sewage Trestle located on Lake Washington Boulevard.

3.9.1.7 Alternative 7 (SR 520 HOV/BRT)

Alternative 7 would have similar potential direct or indirect impacts on previously recorded cultural resources as Alternative 5.

3.9.1.8 Alternative 8 (SR 520 HOV/BRT, GP)

Alternative 8 would have similar potential direct or indirect impacts on previously recorded cultural resources as Alternative 5.

3.9.2 Rating of Alternatives

Alternatives 3 and 4 have the potential to impact the greatest number of previously recorded cultural resources (four), and Alternatives 2 and 6 would impact the second greatest number of cultural resources (three). Alternatives 5, 7, and 8 would potentially impact the same previously recorded cultural resources (two). Since historic properties, particularly in urban settings, have fixed, tangible boundaries, impact avoidance can often be achieved through small design changes. Any historic properties could also be considered Section 4(f) properties. Therefore, any

historic property impacts that could not be avoided could be subject to evaluation under the guidelines of Section 4(f) of the U.S. Department of Transportation Act of 1966. As part of the Section 4(f) Evaluation, avoidance alternatives would need to be considered and selected if found to be feasible and prudent.

The multi-modal alternatives were given two ratings: (1) relative impacts and mitigation required for each alternative, and (2) the feasibility of that mitigation. In addition, the alternatives were ranked based on the impacts associated with each alternative and the feasibility of mitigating those impacts. Each alternative was ranked relative to the other alternatives with 8 being the alternative with the least impacts on previously recorded cultural resources, and 1 being the alternative with the most impacts.

RATING SCALE

WORST → BEST				
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

Cultural Resources	**Alternative**							
	1: No Action	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts and Extent of Mitigation Required	4 no	2 medium	1 most	1 most	3 least	2 medium	3 least	3 least
Feasibility of Proposed Mitigation	NA	2 low feasibility	2 low feasibility	2 low feasibility	4 medium feasibility	2 low feasibility	4 medium feasibility	4 medium feasibility
Ranking	8	4	2	1	6	3	7	5

3.10 DISPLACEMENTS AND DISRUPTION

Screening Criteria: *Planning-level estimates of the number of displacements by general type of land use (residential, commercial, public).*

3.10.1 Impacts of Each Alternative

For this programmatic level of analysis, displacements identified are only potential displacements and will become more accurate as the alternatives are further defined in the EIS.

Table 3.10-1 includes planning-level estimates of potential displaced properties for each build alternative.

Table 3.10-1 Total Existing Structures Potentially Affected by Alternative

	Alternative							
Existing Land Uses	**1: No Action**	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/ BRT**	**8: HOV/ BRT, GP**
SR 520 Corridor								
Multi-Family	-	-	-	1	-	-	3	5
Single-Family	-	2	3	3	5	6	5	4
Commercial	-	2	8	17	9	12	9	16
Industrial	-	-	-	1	-	1	-	1
Public	-	2	2	2	2	2	2	2
Sub-Total	**0**	**6**	**13**	**24**	**16**	**21**	**19**	**28**
Outside SR 520 Corridor (HCT Only)								
Multi-Family	-	-	-	1	-	-	-	-
Single-Family	-	3	3	3	-	-	1	1
Commercial	-	7	8	8	19	19	9	9
Industrial	-	3	3	3	10	10	9	9
Public	-	-	-	-	-	-	-	-
Sub-Total	**0**	**13**	**14**	**11**	**29**	**29**	**19**	**19**
Alternative Total[a]	**0**	**19**	**27**	**35**	**45**	**50**	**38**	**47**

[a] These totals are estimates based on aerial photographs.

3.10.1.1 Alternative 1 (No Action)

No displacements would occur under the No Action Alternative.

3.10.1.2 Alternative 2 (Safety & Preservation, I-90 LRT)

Alternative 2 would result in the least level of potential displacements. Alternative 2 would result in low level potential displacements to public facilities in the vicinity of Montlake area and single-family residences in the Medina area as a result of the north realignment of SR 520, and low level commercial displacements as a result of the elevated LRT segment traversing an established commercial area south of SR 520 as the alignment departs the BNSFRR right-of way.

3.10.1.3 Alternative 3 (SR 520 HOV, I-90 LRT)

Alternative 3 would result in a medium level of potential displacements. Alternative 3 would result in low level potential displacements similar to Alternative 2 in the Montlake area. Similar low level single-family displacements compared to Alternative 2 would occur as SR 520 realigns north, but additional low level displacements would occur from the redeveloped SR 520/I-405 interchange. LRT displacements to commercial facilities in the vicinity of the BNSFRR right-of-way and SR 520 would be similar to Alternative 2.

3.10.1.4 Alternative 4 (SR 520 HOV, GP, I-90 LRT)

Alternative 4 would result in medium level potential displacements. Alternative 4 would result in low level potential displacements similar to Alternative 2 in the Montlake area, but would also include commercial and multi-family displacements as a result of the Fairview/Eastlake connector tunnel. Similar low level single-family displacements compared to Alternative 2 would occur as SR 520 realigns north, but additional medium level displacements would occur from the redeveloped Bellevue Way/SR 520 interchange and the extensive redevelopment of the SR 520/I-405 interchange (which includes HOV and GP onramps and offramps). LRT displacements to commercial facilities in the vicinity of the BNSFRR right-of-way and SR 520 would be similar to Alternative 2.

3.10.1.5 Alternative 5 (SR 520 HOV, SR 520)

Alternative 5 would result in medium level potential displacements. Alternative 5 would result in low level potential displacements similar to Alternative 2 in the Montlake area, but also would include medium level displacements near South Lake Union as the HCT segment of the alternative transitions from a below-grade to an elevated alignment in two locations. Single-family displacements would occur similar to Alternative 3 as SR 520 realigns northward; low level commercial displacements would also occur at the Bellevue Way/SR 520 interchange as the HCT portion of this alternative veers north from the SR 520 corridor to the BNSFRR right-of-way (west of I-405), and low level commercial displacements would occur as the SR 520/I-405 interchange is redesigned. HCT displacements to commercial facilities in the vicinity of the BNSFRR right-of-way (east of I-405) and SR 520 would be similar to Alternative 2. Few commercial displacements would occur north of West Lake Sammamish Parkway near the Central Business District of Redmond.

3.10.1.6 Alternative 6 (SR 520, GP, SR 520 I-90)

Alternative 6 would result in the most potential displacements. Alternative 6 would result in low level potential displacements similar to Alternative 5 in Montlake and South Lake Union. Single-family and commercial displacements similar to Alternative 5 would occur as SR 520 is realigned farther north and the HCT segment of the alternative veers north to the BNSFRR right-of-way (west of I-405). Commercial impacts would occur at the SR 520/I-405 interchange similar to Alternative 4 and low level commercial displacements would occur near the NE 40th Street/SR 520 interchange. HCT displacements to commercial facilities in the vicinity of the BNSFRR right-of-way (east of I-405) and SR 520 would be similar to Alternative 2.

3.10.1.7 Alternative 7 (SR 520 HOV/BRT)

Alternative 7 would result in a medium level of potential displacements. Alternative 7 would result in moderate level potential commercial, multi-family, and single-family displacements in the Fairview/Eastlake area as a result of the BRT/HOV cut-and-cover connector tunnel. Single-family and commercial displacements would occur similar to Alternative 5 as SR 520 realigns north and the SR 520/I-405 interchanged is redesigned. No displacements would occur east of the SR 520/I-405 interchange.

3.10.1.8 Alternative 8 (SR 520 HOV/BRT, GP)

Alternative 8 would result in the second most potential displacements. Alternative 8 would result in moderate level potential commercial, multi-family, and single-family displacements in the Fairview/Eastlake area similar to Alternative 7, but also would include the additional impact of the Fairview/Eastlake cut-and-cover connector with a GP as well as a BRT/HOV lane. Single-family and commercial displacements would be similar to Alternative 6 as SR 520 realigns north and the SR 520/I-405 interchange is redesigned. Low level commercial displacements would occur east of the SR 520/I-405 interchange near the NE 40th Street/SR 520 interchange.

3.10.2 Rating of Alternatives

Alternative 6 would have the greatest potential number of displacements, closely followed by Alternative 8. After the No Action Alternative, Alternatives 2 and 3 would have the fewest displacements.

The multi-modal alternatives were given two ratings: (1) relative impacts and mitigation required for each alternative, and (2) the feasibility of that mitigation. In addition, the alternatives were ranked based on the impacts associated with each alternative and the feasibility of mitigating those impacts. Each alternative was ranked relative to the other alternatives with 8 being the alternative with the least impacts, and 1 being the alternative with the most impacts. In general, the alternative with the widest typical footprint would have the greatest impact.

RATING SCALE

WORST →				BEST
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

Displacements and Disruption	**Alternative**							
	1: No Action	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts and Extent of Mitigation Required	4 no	3 least	2 medium	2 medium	2 medium	1 most	2 medium	1 most
Feasibility of Proposed Mitigation	NA	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible	1 least feasible
Ranking	8	7	6	5	3	1	4	2

3.11 NEIGHBORHOODS

Screening Criteria: *A qualitative screening level evaluation of potential neighborhood quality of life impacts will be conducted through a preliminary assessment of displacements, traffic issues, noise and vibration, and changes in access related to each project alternative. This will also address the demographic characteristics of affected areas. The evaluation will use the findings and data sources identified for the other criteria that are related to neighborhood disruption.*

3.11.1 Impacts of Each Alternative

Potential mitigation measures would be common for all alternatives and would generally be feasible. Implementing proposed mitigation measures for displacements, traffic, noise, land use, and visual quality would help to minimize overall impacts on neighborhoods. To ensure neighborhood connectivity, key neighborhood streets should be maintained as necessary by preserving overcrossings and undercrossings. Where feasible, pedestrian and bicycle bridges should be provided across the highway/HCT profile to provide additional connections between portions of bisected neighborhoods.

3.11.1.1 Alternative 1 (No Action)

The No Action Alternative could have neighborhood impacts by failing to provide adequate transportation capacity. The lack of SR 520 congestion relief in several areas may result in traffic seeking alternative routes through neighborhoods. Additional neighborhood traffic could hinder inter- and intra-neighborhood movement. Increased congestion also could result in higher air emissions from vehicle exhaust. No land use or displacement impacts would occur. The overall impact on area neighborhoods would be low.

3.11.1.2 Alternative 2 (Safety & Preservation, I-90 LRT)

Most of the impacts associated with Alternative 2 would result from the LRT alignment. Most of the proposed highway improvements would occur within the existing right-of-way and would not impact neighborhoods. Most of the LRT alignment would operate within existing rights-of-way along I-90 and SR 520, however it would also traverse through portions of the Southeast Bellevue, Bel-Red/Northup, and Overlake neighborhoods. These neighborhoods would experience land use acquisitions, displacements, and possible visual impacts. Neighborhoods near the LRT alignment would be closer to existing noise because of the widened right-of-way accommodating the alignment. Air quality and traffic impacts are expected to be similar to the No Action Alternative. Since nearly all of these impacts would occur on the periphery of the neighborhoods, they would not fragment communities. Overall neighborhood impacts would be low compared to other alternatives.

Alternative 2 would pass by several neighborhoods with areas that have minority populations greater than 50 percent. These neighborhoods include the International District, North Rainier,

Central Area, Mercer Island, Lakeview, West Bellevue, Overlake and South Redmond. No areas with low-income populations greater than 50 percent would be affected by this alternative.

3.11.1.3 Alternative 3 (SR 520 HOV, I-90 LRT)

Alternative 3 would require widening SR 520 in places to accommodate an additional HOV lane and the LRT alignment east of I-405. This would result in the acquisition of land, a few displacements, and the movement of noise impacts closer to existing uses. Traffic volumes along SR 520 would be higher, which would also result in increased delay times at intersections near the corridor. Land use, noise, and traffic impacts would mainly occur near Seattle neighborhoods. These impacts would be isolated along the edges of neighborhoods, which would reduce the magnitude of their impacts. LRT impacts would be the same as in Alternative 2. Overall neighborhood impacts would be low.

Alternative 3 would affect the same minority and low-income areas as Alternative 2.

3.11.1.4 Alternative 4 (SR 520 HOV, GP, I-90 LRT)

Alternative 4 would require widening throughout the SR 520 corridor. This would result in more extensive land use, displacement, and noise impacts along the entire corridor. Also, the carrying capacity of SR 520 would deliver substantially more traffic to the area, which could increase the amount of cut-through traffic in nearby neighborhoods in Seattle, Medina, Hunts Point and Clyde Hill. Still, these impacts mostly would be isolated along the edges of neighborhoods, which would reduce the magnitude of their impacts. One exception would be the Montlake neighborhood, where additional traffic and a new interchange configuration would increase the scale of the SR 520 facility and would create a larger physical barrier through the neighborhood. Also, considerably more traffic would be delivered into the Southeast Redmond neighborhood via the highway's terminus. LRT impacts would be the same as in Alternative 2. Overall neighborhood impacts would be high compared to the other alternatives.

Alternative 4 would affect the same minority and low-income areas as Alternative 2.

3.11.1.5 Alternative 5 (SR 520 HOV, SR 520 HCT)

Alternative 5 would concentrate neighborhood effects along the SR 520 corridor instead of dispersing them between SR 520 and I-90. Fewer total neighborhoods would be affected because transportation improvements would be constrained to a single corridor. Most of the HCT alignment through Seattle would be below-grade, minimizing neighborhood impacts. Once the HCT alignment joins the SR 520 right-of-way, this alternative would have a widened corridor, which would result in additional land use acquisition and displacements along the SR 520 corridor. Highway noise would be closer to existing land uses because of the wider footprint but may not be noticeable given the extent of existing noise and small degree of anticipated impact. With the exception of the HCT alignment through Bel-Red/Northup and Overlake, impacts created by Alternative 5 would originate from within the SR 520 corridor and would impact the outskirts of neighborhoods. This would minimize the magnitude of the impacts and have a low impact on neighborhoods overall.

Alternative 5 would pass by several neighborhoods with areas that have minority populations greater than 50 percent. These neighborhoods include Denny Triangle, South Lake Union, Fremont, University, Lakeview, West Bellevue, Overlake and South Redmond. No areas with low-income populations greater than 50 percent would be affected by this alternative.

3.11.1.6 Alternative 6 (SR 520 HOV, GP, SR 520 HCT)

Like Alternative 5, Alternative 6 would concentrate neighborhood effects along the SR 520 corridor. Because the highway would be two lanes wider, neighborhood impacts would be greater throughout the corridor than in Alternative 5. Also, the carrying capacity of SR 520 would deliver substantially more traffic to the area, which could increase the amount of cut-through traffic in nearby neighborhoods. Still, these impacts would be isolated along the edges of neighborhoods, which would reduce the magnitude of their impacts. Overall neighborhood impacts would be high compared to the other alternatives.

Alternative 6 would affect the same minority and low-income areas as Alternative 5.

3.11.1.7 Alternative 7 (SR 520 HOV/BRT)

Alternative 7 would have impacts throughout the SR 520 corridor similar to Alternative 3. The main difference between those two alternatives is the alignment of the BRT lanes which start in downtown Seattle, extend through the Eastlake neighborhood, and then stay within the SR 520 and I-405 rights-of-way. Because the BRT alignment does not stray from existing right-of-way from I-5 to the east, the number of neighborhoods that would be impacted, as well as the magnitude of impacts, is substantially reduced. Overall neighborhood impacts would be low compared to other alternatives.

Alternative 7 would pass by several neighborhoods with areas that have minority populations greater than 50 percent. These neighborhoods include Denny Triangle, South Lake Union, Eastlake, Lakeview, West Bellevue, Overlake and South Redmond. No areas with low-income populations greater than 50 percent would be affected by this alternative.

3.11.1.8 Alternative 8 (SR 520 HOV/BRT, GP)

Alternative 8 would have all of the same impacts as Alternative 7, except to a greater degree. This is due to the additional GP lane in each direction on SR 520. The wider footprint would result in a greater degree of land acquisition, displacements, and noise impacts. Because impacts are concentrated within the SR 520 corridor, Alternative 8 has a lesser impact than the other two 8-lane alternatives, Alternatives 4 and 6. Still, the carrying capacity of this alternative could create cut-through traffic problems in nearby neighborhoods. The overall neighborhood impact for this alternative would be moderate.

Alternative 8 would affect the same minority and low-income areas as Alternative 7.

3.11.2 Rating of Alternatives

The magnitude of neighborhood impacts is generally related to the carrying capacity of the alternative and the increases in noise and traffic that would likely accompany capacity increases. In addition, alternatives with wider footprints physically intrude more into the neighborhoods, causing greater impacts. Many neighborhood effects are dampened somewhat by the fact that, in general, most improvements would take place within existing transportation corridors.

Because impacts on neighborhoods are largely a compilation of impacts on other resources, avoidance, minimization, and mitigation measures identified in other sections (primarily noise, air quality, and visual quality) would also apply to neighborhoods. Mitigation measures that knit the neighborhoods together to create a greater sense of community would primarily include lidding and tunneling of highway facilities.

RATING SCALE

WORST → BEST				
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

Neighborhoods	**Alternative**							
	1: No Action	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts and Extent of Mitigation Required	2 medium	3 least	3 least	1 most	3 least	1 most	3 least	2 medium
Feasibility of Proposed Mitigation	NA	3 medium feasibility	3 medium feasibility	3 medium feasibility	3 medium feasibility	3 medium feasibility	3 medium feasibility	3 medium feasibility
Ranking	1	6	5	2	4	1	7	3

3.12 VISUAL QUALITY

Screening Criteria: *A qualitative assessment of visual impacts will include identification of sensitive receptors and impacts on significant visual resources or scenic views.*

3.12.1 Impacts of Each Alternative

A description of impacts for each of the alternatives assumes a level of impact that is based on the impacts generated by the previous alternative.

3.12.1.1 Alternative 1 (No Action)

Because the No Action Alternative does not include proposed improvements, it generates no visual impacts.

3.12.1.2 Alternative 2 (Safety & Preservation, I-90 LRT)

Replacement of the Portage Bay Bridge and the SR 520 floating bridge would generate moderate to high-level visual impacts. The LRT structures would have low to moderate impacts in Seattle and across Lake Washington, however impact levels in the Bellevue, Overlake, and Redmond areas would be moderate to high.

Impacts could be mitigated by replanting removed vegetation, screening views of proposed transportation-related structures, and minimizing the heights of structures where possible. Impacts from stations and station entries could be mitigating by designing them to fit the character of their surroundings.

Impacts in the Overlake and Redmond areas could be greatly avoided and minimized by utilizing the SR 520 corridor where possible.

3.12.1.3 Alternative 3 (SR 520 HOV, I-90 LRT)

In addition to the impacts described for Alternative 2, Alternative 3 would create moderate to high level impacts in the Seattle area by building a wider highway cross section, reworking surface streets in the Montlake neighborhood and University of Washington, and reworking I-5 lanes.

Mitigation would be similar to that described for Alternative 2.

3.12.1.4 Alternative 4 (SR 520 HOV, GP, I-90 LRT)

In addition to the impacts described for Alternatives 2 and 3, Alternative 4 would result in additional low to high level visual impacts because of a wider highway cross section, major reworking surface streets in the Eastlake neighborhood, and extensive reworking of I-5 lanes.

Mitigation would be similar to that described for Alternative 2.

3.12.1.5 Alternative 5 (SR 520 HOV, SR 520 HCT)

In addition to impacts described for Alternatives 2 and 3, Alternative 5 would create additional low to moderately high level visual impacts because of the HCT alignment from downtown Seattle, through the Queen Anne, Fremont, Wallingford, and University District neighborhoods. Although the HCT facilities would generate additional impacts within the SR 520 corridor in Seattle, these impacts would be offset somewhat by the lack of HCT facilities in the south part of Bellevue, which would reduce the impacts for this alternative. HCT alignments in the SR 520/I-405 interchange area would generate additional low to moderate level impacts. Reworking of the I-5 corridor would not be as extensive as Alternatives 3 and 4.

Mitigation would be similar to that described for Alternative 2.

3.12.1.6 Alternative 6 (SR 520 HOV, GP, SR 520 HCT)

Alternative 6 would result in similar visual impacts as described for Alternative 5, with the exception of the visual impacts associated with the reworking of the I-5 corridor. Visual impacts in the I-5 corridor would be similar to Alternative 4.

Mitigation would be similar to that described for Alternative 2.

3.12.1.7 Alternative 7 (SR 520 HOV/BRT)

Because Alternative 7 utilizes existing highway corridors more than any other build alternative, it generates the fewest and lowest level visual impacts.

Impacts could be mitigated by replanting removed vegetation, screening views of proposed transportation-related structures, and minimizing the heights of structures where possible.

3.12.1.8 Alternative 8 (SR 520 HOV/BRT, GP)

Alternative 8 is similar to Alternative 7, however its wider highway cross section would generate slightly higher visual impact levels.

Mitigation would be similar to that described for Alternative 7.

3.12.2 Rating of Alternatives

Alternatives 2, 3, and 4 would result in the greatest impacts on visual quality, whereas Alternatives 7 and 8 would result in the least impacts of the build alternatives. In general, HCT alignments in new corridors would have greater visual quality impacts than widening existing highway corridors.

The multi-modal alternatives were given two ratings: (1) relative impacts and mitigation required for each alternative, and (2) the feasibility of that mitigation. In addition, the alternatives were ranked based on the impacts associated with each alternative and the feasibility of mitigating those impacts. Each alternative was ranked relative to the other alternatives with 8 being the

alternative with the least impacts on visual resources, and 1 being the alternative with the most impacts.

RATING SCALE

WORST →				BEST
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Ratings Table

Visual Quality	**Alternative**							
	1: No Action	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Impacts and Extent of Mitigation Required	4 no	1 most	1 most	1 most	2 medium	2 medium	3 low	3 low
Feasibility of Proposed Mitigation	NA	1 least feasible	1 least feasible	1 least feasible	3 medium feasibility	3 medium feasibility	4 most feasible	4 most feasible
Ranking	1	6	7	8	4	5	2	3

3.13 OVERALL COMPARATIVE SUMMARY

The following provides a comparative summary of the level of impacts for each alternative by environmental resources.

RATING SCALE

WORST → BEST				
1	2	3	4	5
Most Impacts	Medium Impacts	Least Impacts	No Impact	Improved Environment

Environmental Criteria Ratings Summary

Criteria	Alternative							
	1: No Action	**2: S&P, I-90 LRT**	**3: HOV, I-90 LRT**	**4: HOV, GP, I-90 LRT**	**5: HOV, 520 HCT**	**6: HOV, GP, 520 HCT**	**7: HOV/BRT**	**8: HOV/ BRT, GP**
Air Quality	3 least	3 least	3 least	2 medium	3 least	2 medium	3 least	**1** most
Water Resources	3 least	2 medium	**1** most	**1** most	**1** most	**1** most	**1** most	**1** most
Fish-Bearing Streams	4 no	3 least	2 medium	2 medium	3 least	1 most	3 least	3 least
Critical Upland Habitat	3 least	2 medium	2 medium	1 most	2 medium	1 most	2 medium	1 most
Wetlands and Shorelines	4 no	2 medium	1 most	1 most	1 most	1 most	1 most	1 most
Noise and Vibration	3 least	3 least	2 medium	1 most	2 medium	1 most	2 medium	1 most
Land Use	4 no	3 least	3 least	2 medium	2 medium	1 most	3 least	2 medium
Parklands	4 no	3 least	2 medium	1 most	2 medium	1 most	3 least	2 medium
Cultural Resources	4 no	2 medium	1 most	1 most	3 least	2 medium	3 least	3 least
Displacements and Disruption	4 no	3 least	2 medium	2 medium	2 medium	1 most	2 medium	1 most
Neighborhoods	2 medium	3 least	3 least	1 most	3 least	1 most	3 least	2 medium
Visual Quality	4 no	1 most	1 most	1 most	2 medium	2 medium	3 least	3 least